





CE C





# **Model Number**

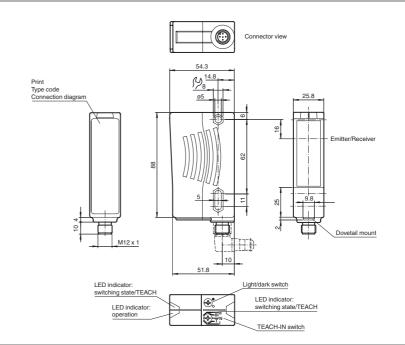
#### RL28-54-G/47/105

Retroreflective sensor with 5-pin, M12 x 1 plastic connector

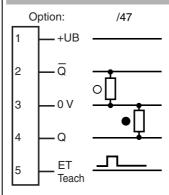
# **Features**

- Detects transparent objects, i.e., clear glass, PET and transparent films
- TEACH-IN switch for setting the contrast detection levels
- Automatic adjustment in case of soiling in contrast detection mode
- Ultra bright LEDs for power on, pre fault indication and switching state
- Flashing power on LED in case of short-circuit
- Not sensitive to ambient light, even with energy saving lamps
- Waterproof, protection degree IP67
- Protection class II

#### **Dimensions**



# **Electrical connection**



- O = Light on
- = Dark on

### **Pinout**



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Effective detection range  Effective detection range  Reflector distance  O5.6 m  Reflector distance  Threshold detection range  Reflector distance  Light source  Light source  Light type  Diameter of the light spot  Angle of divergence  Ambient light limit  Functional safety related parameters  MTFr <sub>d</sub> Mission Time (T <sub>M</sub> )  Diagnostic Coverage (DC)  Indicators/operating means  Operating display  LED green, flashes in case of short-circuit  2 LED syellow for switching state, stability control, TEACH-IN and contrast detection mode  Controls  Controls  Controls  Contrast detection levels  To % - clean, water filled PET bottles  18 % - clear glass bottles  40 % - colored glass or opaque materials  adjustable by TEACH-IN key or external wire  Electrical specifications  Operating voltage  Ripple  No-load supply current  Input  Function input  Ext. Teach-In input (ET)  Output  Switching type  Signal output  Punction input  Ext. Teach-In input (ET)  Output  Switching type  Signal output  Punction input  Ext. Teach-In input (ET)  Output  Switching type  Signal output  2 PNP, complementary, short-circuit protected, reverse polarity protected , open collectors  max. 200 mA  Voltage drop  Ug 2 S V DC  Switching frequency f 1000 Hz  Response time  Open Material  Housing  Plastic ABS  Optical face  Connection  Material  Housing  Plastic pane  Connection degree  Connector  Material  Housing  Plastic pane  Conpliance with standards and directives  Standard conformity  Product standard  EN 60947-5-2:2007  Approvals and certificates  Protection class  II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1  CULus  CCC approval	Technical data		
Reflector distance Reflector distance Reflector distance Reflerence target Light source Light type Diameter of the light spot Angle of divergence Ambient light limit SOOOD Lux Functional safety related parameters MITF₄ Mission Time (TM) Diagnostic Coverage (DC) Indicators/operating means Operating display Controls Controls Controls Controls Controls Controls  Electrical specifications Operating voltage Ripple No-load supply current Function input Ext. Teach-In input (ET) Output Switching type Signal output Switching type Signal output Switching voltage Signal output Switching voltage Signal output Switching frequency Repose time Ambient conditions Ambient temperature Switching frequency Protected open Uag Switching frequency Repose time Ambient conditions Ambient conditions Ambient temperature Storage temperature Storage temperature Storage temperature Protection degree Protection degree Protection degree Plastic pane Compliance with standards and directives Standard conformity Product standard Fin Geoverage Ripple Repose time time time time time time time tim			
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Threshold detection range  Reference target Light source Light type Diameter of the light spot Angle of divergence Ambient light limit  Functional safety related parameters MTF <sub>G</sub> Diagnostic Coverage (DC) Indicators/operating means Operating display Function display  Controls  Controls  Controls  Contrast detection levels  LED green, flashes in case of short-circuit Function display  LED green, flashes in case of short-circuit Fu	· ·		
Reference target Light source Light type modulated visible red light, 660 nm Diameter of the light spot Angle of divergence Ambient light limit Functional safety related parameters MTTF, Mission Time (T <sub>M</sub> ) 20 a Diagnostic Coverage (DC) Indicators/operating means Operating display Function dis			
Light source  Light type  Light type  Industry typ	Threshold detection range		/ m
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Functional safety related parameters           MTTF <sub>d</sub> 1020 a           Mission Time (T <sub>M</sub> )         20 a           Diagnostic Coverage (DC)         0 %           Indicators/operating means         Operating display           Operating display         LED green, flashes in case of short-circuit           Function display         2 LEDs yellow for switching state, stability control, TEACH-IN and contrast detection mode           Controls         rotary switch for light/dark, 5-step switch for contrast recognition adjustment           Contrast detection levels         10 % - clean, water filled PET bottles           18 % - clear glass bottles         40 % - colored glass or opaque materials adjustable by TEACH-IN key or external wire           Electrical specifications           Operating voltage         U <sub>B</sub> 10 30 V DC           Ripple         10 %         No-load supply current log %         5 0 mA           Input         Ext. Teach-In input (ET)         Output         Ext. Teach-In input (ET)           Output         Switching type         light/dark on switchable         2 PNP, complementary, short-circuit protected, reverse polarity protected , open collectors           Switching voltage         max. 30 V DC         switching frequency         f         1000 Hz           Switching frequency         f			
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Indicators/operating means	Mission Time (T <sub>M</sub> )		20 a
Operating display Function display  Eunction display  Eunction display  Controls  Controls  Controls  Controls  Contrast detection levels  Contrast detection mode  rotary switch for light/dark, 5-step switch for contrast recognition adjustment  10 % - clear, water filled PET bottles  18 % - clear glass bottles  18 % - clear glass bottles  10 % - clear glass bottles  10 % - Clear, water filled PET bottles  10 % - Clear, water filled	Diagnostic Coverage (DC)		0 %
Function display  Controls  Controls  Controls  Contrast detection levels  Contrast detection levels  10 % - clean, water filled PET bottles 18 % - clear glass bottles 40 % - colored glass or opaque materials adjustable by TEACH-IN key or external wire  Electrical specifications  Operating voltage  Operating voltage  Operating voltage  No-load supply current  Input  Function input  Switching type  Signal output  Switching type  Switching overent  Notage of pen collectors  Switching voltage  Max 30 V DC  Switching voltage  Switching voltage  Max 30 V DC  Switching current  Voltage drop  Switching current  Voltage drop  Voltage  Switching frequency  f 1000 Hz  Response time  0.5 ms  Ambient conditions  Ambient temperature  -40 60 °C (-40 140 °F)  Storage temperature  -40 75 °C (-40 167 °F)  Mechanical specifications  Protection degree  Popical face  Connection  Material  Housing  Optical face  Plastic ABS  Optical face  Plastic pane  Connector  plastic  Ams  Standard conformity  Product standard  EN 60947-5-2:2007  Approvals and certificates  Protection class  II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to ICC approval  Products with a maximum operating voltage of ≤36 V do not	Indicators/operating means		
and contrast detection mode  Controls rotary switch for light/dark, 5-step switch for contrast recognition adjustment  Contrast detection levels 10 % - colored glass or opaque materials adjustable by TEACH-IN key or external wire  Electrical specifications  Operating voltage UB 10 30 V DC  Ripple 10 %  No-load supply current I₀ ≤ 50 mA  Input  Function input Ext. Teach-In input (ET)  Output  Switching type light/dark on switchable  Signal output 2 PNP complementary, short-circuit protected, reverse polarity protected , open collectors  max. 30 V DC  Switching current max. 200 mA  Voltage drop Ud ≤ 2.5 V DC  Switching frequency f 1000 Hz  Response time 0.5 ms  Ambient conditions  Ambient demonstrate 40 60 °C (-40 140 °F)  Storage temperature 40 60 °C (-40 140 °F)  Storage temperature 1P67  Connection M12 x 1 connector, 5-pin  Material  Housing Plastic ABS  Optical face Plastic pane Connector plastic  Mass 70 g  Compliance with standards and directives  Standard conformity  Product standard EN 60947-5-2:2007  Approvals and certificates  Protection class II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1  CUL approval  CCC approval Products with a maximum operating voltage of ≤36 V do not	Operating display		LED green, flashes in case of short-circuit
Controls  Contrast detection levels  Contraction  Contr	Function display		
Contrast detection levels  10 % - clean, water filled PET bottles 18 % - clear glass bottles 40 % - colored glass or opaque materials adjustable by TEACH-IN key or external wire  Electrical specifications  Operating voltage  No-load supply current  Input  Function input  Switching type  Signal output  Switching voltage  Switching current  Voltage drop  Voltage drop  Voltage drop  Voltage drop  Switching frequency  Fasponse time  Ambient conditions  Ambient emperature  Protection degree  Connection  Material  Housing  Optical face Connector  Mass  To g  Compliance with standards and directives  Protection class  II, rated voltage ≤ 250 ∨ AC with pollution degree 1-2 according to 1EC 60664-1  CUL approval  CCC approval  Products with a maximum operating voltage of ≤36 ∨ do not  Products with a maximum operating voltage of ≤36 ∨ do not  Products with a maximum operating voltage of ≤36 ∨ do not  Products with a maximum operating voltage of ≤36 ∨ do not  Products with a maximum operating voltage of ≤36 ∨ do not  Products with a maximum operating voltage of ≤36 ∨ do not  Products with a maximum operating voltage of ≤36 ∨ do not  Products with a maximum operating voltage of ≤36 ∨ do not	Controls		rotary switch for light/dark, 5-step switch for contrast recognition
Electrical specifications  Operating voltage UB 10 30 V DC Ripple 10 %  No-load supply current I0 ≤50 mA  Input  Function input Ext. Teach-In input (ET)  Output  Switching type IIght/dark on switchable Signal output 2 PNP, complementary, short-circuit protected, reverse polarity protected , open collectors  Switching voltage max. 30 V DC  Switching current max. 200 mA  Voltage drop Ud ≤2.5 V DC  Switching frequency f 1000 Hz  Response time 0.5 ms  Ambient conditions  Ambient temperature -40 60 °C (-40 140 °F)  Storage temperature -40 75 °C (-40 167 °F)  Mechanical specifications  Protection degree IP67  Connection M12 x 1 connector, 5-pin  Material  Housing Plastic ABS  Optical face Plastic ABS  Optical face Plastic pane  Connector plastic  Mass 70 g  Compliance with standards and directives  Standard conformity  Product standard EN 60947-5-2:2007  Approvals and certificates  Protection class II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1  CULus  CCC approval Products with a maximum operating voltage of ≤36 V do not	Contrast detection levels		10 % - clean, water filled PET bottles
Operating voltage   U <sub>B</sub>   10 30 V DC   Ripple   10 %   No-load supply current   I <sub>0</sub> ≤ 50 mA   Input   Function input   Ext. Teach-In input (ET)  Output   Switching type   light/dark on switchable   Signal output   2 PNP, complementary, short-circuit protected, reverse polarity protected , open collectors   Switching voltage   max. 30 V DC   Switching current   max. 200 mA   Voltage drop   U <sub>d</sub> ≤ 2.5 V DC   Switching frequency   f 1000 Hz   Response time   0.5 ms   Ambient conditions   Ambient temperature   -40 60 °C (-40 140 °F)   Storage temperature   -40 75 °C (-40 167 °F)   Mechanical specifications   Protection degree   IP67   Connection   M12 x 1 connector, 5-pin   Material   Housing   Plastic ABS   Optical face   Plastic pane   Connector   plastic   Mass   70 g   Compliance with standards and directives   Standard conformity   Product standard   EN 60947-5-2:2007    Approvals and certificates   Protection class   II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1   CULus   CCC approval   Products with a maximum operating voltage of ≤36 V do not			40 % - colored glass or opaque materials
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Input     Ext. Teach-In input (ET)       Output     Switching type     light/dark on switchable       Signal output     2 PNP, complementary, short-circuit protected, reverse polarity protected , open collectors       Switching voltage     max. 30 V DC       Switching current     max. 200 mA       Voltage drop     U <sub>d</sub> ≤ 2.5 V DC       Switching frequency     f 1000 Hz       Response time     0.5 ms       Ambient conditions     0.5 ms       Ambient temperature     -40 60 °C (-40 140 °F)       Storage temperature     -40 75 °C (-40 167 °F)       Mechanical specifications     Protection degree       Protection degree     IP67       Connection     M12 x 1 connector, 5-pin       Material     Housing       Housing     Plastic ABS       Optical face     Plastic pane       Connector     plastic       Mass     70 g       Compliance with standards and directives       Standard conformity     EN 60947-5-2:2007       Approvals and certificates       Protection class     II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1       UL approval     cULus       CCC approval     Products with a maximum operating voltage of ≤36 V do not		l۵	< 50 mA
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Output         Switching type       light/dark on switchable         Signal output       2 PNP, complementary, short-circuit protected, reverse polarity protected , open collectors         Switching voltage       max. 30 V DC         Switching current       max. 200 mA         Voltage drop       U <sub>d</sub> ≤ 2.5 V DC         Switching frequency       f       1000 Hz         Response time       0.5 ms         Ambient conditions       Ambient temperature       -40 60 °C (-40 140 °F)         Storage temperature       -40 75 °C (-40 167 °F)         Mechanical specifications       Protection degree       IP67         Connection       M12 x 1 connector, 5-pin         Material       Housing       Plastic ABS         Optical face       Plastic pane         Connector       plastic         Mass       70 g         Compliance with standards and directives         Standard conformity       Foduct standard         Product standard       EN 60947-5-2:2007         Approvals and certificates       II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1         UL approval       CULus         CCC approval       Products with a maximum operating voltage of ≤36 V do not <td>•</td> <td></td> <td>Ext. Teach-In input (ET)</td>	•		Ext. Teach-In input (ET)
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Switching current max. 200 mA   Voltage drop U <sub>d</sub> ≤ 2.5 V DC   Switching frequency f 1000 Hz   Response time 0.5 ms   Ambient conditions -40 60 °C (-40 140 °F)   Ambient temperature -40 75 °C (-40 167 °F)   Storage temperature -40 75 °C (-40 167 °F)   Mechanical specifications Protection degree   Protection degree IP67   Connection M12 x 1 connector, 5-pin   Material Housing Plastic ABS   Optical face Plastic pane   Connector plastic   Mass 70 g   Compliance with standards and directives   Standard conformity Froduct standard   Protection class II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1   UL approval CULus   CCC approval Products with a maximum operating voltage of ≤36 V do not	· ·		protected , open collectors
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Storage temperature  -40 75 °C (-40 167 °F)  Mechanical specifications  Protection degree  IP67  Connection  M12 x 1 connector, 5-pin  Material  Housing  Plastic ABS  Optical face Plastic pane  Connector  plastic  Mass  70 g  Compliance with standards and directives  Standard conformity  Product standard  EN 60947-5-2:2007  Approvals and certificates  Protection class  II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1  UL approval  CCC approval  Products with a maximum operating voltage of ≤36 V do not	Ambient conditions		
Mechanical specifications         Protection degree       IP67         Connection       M12 x 1 connector, 5-pin         Material       Housing         Housing       Plastic ABS         Optical face       Plastic pane         Connector       plastic         Mass       70 g         Compliance with standards and directives         Standard conformity         Product standard       EN 60947-5-2:2007         Approvals and certificates         Protection class       II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1         UL approval       cULus         CCC approval       Products with a maximum operating voltage of ≤36 V do not	Ambient temperature		-40 60 °C (-40 140 °F)
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Connection M12 x 1 connector, 5-pin  Material Housing Plastic ABS Optical face Plastic pane Connector plastic Mass 70 g  Compliance with standards and directives Standard conformity Product standard EN 60947-5-2:2007  Approvals and certificates  Protection class II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1  UL approval cULus  CCC approval Products with a maximum operating voltage of ≤36 V do not	Mechanical specifications		
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Housing Plastic ABS Optical face Plastic pane Connector plastic Mass 70 g  Compliance with standards and directives Standard conformity Product standard EN 60947-5-2:2007  Approvals and certificates  Protection class II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1  UL approval cULus CCC approval Products with a maximum operating voltage of ≤36 V do not	Connection		M12 x 1 connector, 5-pin
Optical face Plastic pane Connector plastic  Mass 70 g  Compliance with standards and directives Standard conformity Product standard EN 60947-5-2:2007  Approvals and certificates  Protection class II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1  UL approval cULus  CCC approval Products with a maximum operating voltage of ≤36 V do not	Material		
Connector plastic  Mass 70 g  Compliance with standards and directives  Standard conformity Product standard EN 60947-5-2:2007  Approvals and certificates  Protection class II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1  UL approval cULus  CCC approval Products with a maximum operating voltage of ≤36 V do not	Housing		Plastic ABS
Mass 70 g  Compliance with standards and directives  Standard conformity Product standard EN 60947-5-2:2007  Approvals and certificates  Protection class II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1  UL approval cULus  CCC approval Products with a maximum operating voltage of ≤36 V do not	Optical face		Plastic pane
Compliance with standards and directives  Standard conformity  Product standard  EN 60947-5-2:2007  Approvals and certificates  Protection class  II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1  UL approval  CCC approval  Products with a maximum operating voltage of ≤36 V do not	Connector		plastic
Compliance with standards and directives         Standard conformity         Product standard       EN 60947-5-2:2007         Approvals and certificates         Protection class       II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1         UL approval       cULus         CCC approval       Products with a maximum operating voltage of ≤36 V do not	Mass		
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Protection class  II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1  UL approval  CCC approval  Products with a maximum operating voltage of ≤36 V do not	·		EN 60947-5-2:2007
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UL approval cULus  CCC approval Products with a maximum operating voltage of ≤36 V do not	• •		
CCC approval Products with a maximum operating voltage of ≤36 V do not	UL approval		
boar a 000 marking because they do not require approval.	* *		

# **Accessories**

# **OMH-05**

Mounting aid for round steel ø 12 mm or sheet 1.5 mm ... 3 mm

#### OMH-07

Mounting aid for round steel ø 12 mm or sheet 1.5 mm ... 3 mm

### **OMH-21**

Mounting bracket

#### **OMH-22**

Mounting bracket

# OMH-MLV11-K

dove tail mounting clamp

#### **OMH-RLK29**

Mounting bracket

# OMH-RLK29-HW

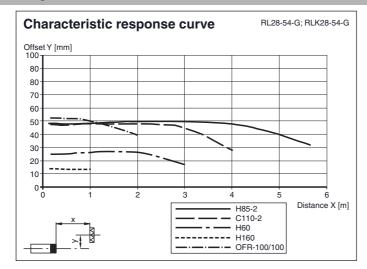
Mounting bracket for rear wall mounting

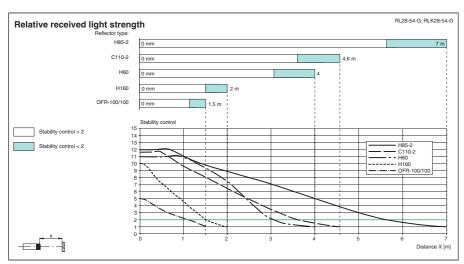
#### OMH-RL28-C

Protective cover

Other suitable accessories can be found at www.pepperl-fuchs.com

# **Curves/Diagrams**





# **TEACH-IN**

- · Switch position "N" (standard operation):
- LEDs are lit when the light beam is unobstructed, they flash when the value falls short of the function reserve and they go out when the beam is interrupted.
- Switch position "T" (Teach-in mode):

After 1 s, the LED flashes slowly (approx. 1.5 Hz). The sensor is now ready to be set for a specific contrast detection value either via the mechanical switch (pos. I, II or III) or an external signal.

- Switch positions "I", "II" and "III" (contrast detection mode)
- Contrast recognition values: I for 10 %, II for 18 %, III for 40 %
- 1. LED permanently lit: light path unobstructed
- 2. LED off: element to be sensed detected
- 3. LED flashes rapidly: detection failure, excessive soiling, function reserve too low.

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# • Ext. TEACH-IN input

The desired contrast recognition capability can be adjusted by applying of a logic "high" pulse with a certain pulse length when the switch is in position T.

50 ms (30 ms ... 100 ms)

150 ms (100 ms ... 200 ms)

> 200 ms

It is possible to change the contrast detection level without re-teaching. For contras detection mode (Teach-Mode) the stability reseve must be at least 2.5 (see curve "relative received light strength")

# Additional information

### **Mounting instructions:**

The sensor is held in place by two pass-through drill holes for M5. The surface underneath must be flat to prevent the housing from moving when it is tightened into position. We recommend securing the nuts in place with spring screws to prevent the sensor from going out of adjustment.

Outdoor mounting:

The sensors must be protected from shock and splashed water. It may be necessary to provide a covering.

### Adjustment:

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Align the unit to the reflector in the "N" switch setting. The yellow LED must be lit constantly. Move the switch to the "T" setting and wait for about 1 sec. until the yellow LED starts flashing slowly.

Move the switch to the setting for the desired contrast detection level: "I" for 10%, "II" for 18%, "III" for 40%.

In switch setting "T", select the appropriate contrast detection level by applying a pulse through the control lead to connection pin 5 (see "TEACH-IN").

#### **Contrast detection levels:**

The output becomes inactive if dirt and dust make it impossible to readjust the setting. In this case the yellow LED will flash quickly.

If dirt and dust continue to accumulate, detection of slight contrasts can no longer be guaranteed.

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